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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/031,364 | 02/19/2002 | Gary Lock | 5626 | 6886 |
| 6858 | 7590 | 05/11/2004 | EXAMINER | |
| BREINER & BREINER 115 NORTH HENRY STREET P. O. BOX 19290 ALEXANDRIA, VA 22314 | | | DIAMOND, ALAN D | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1753 | |

DATE MAILED: 05/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/031,364

Applicant(s)

LOCK ET AL.

Examiner

Alan Diamond

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 February 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. Figures 1 and 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: reference sign TW'' at page 9, line 19. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: reference sign TW''' in Figure 3. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: On page 6, at line 30, the brief description of Figure 1 is missing. Appropriate correction is required.

5. Claim 22 is objected to because of the following informalities: In claim 22, at line 5, the term "MHZ" should be changed to "MHz". Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-15, 21, and 23-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, at line 11, it is not clear what is meant by the term "real part of the imaginary part". It is suggested that said term be changed to "real part or the imaginary part". The same applies to dependent claims 2-15 and 21

Claim 3 is indefinite because the term "the electrodes" at line 3 lack positive antecedent support in claim 1. It is suggested that said term be changed to "electrodes". The same applies to dependent claims 4-15.

Claim 23 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: the relationship between the first frequency signal operating means and the frequency generating means; and the relationship between said operating means, said generating means and the electrode array. The same applies to dependent claims 24 and 25.

Claim 23 is indefinite because it is not clear exactly which means is being referred to by the term "such means" at line 5. The same applies to dependent claims 24 and 25.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-6, 10, 11, 16, 17, 21, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Becker et al, WO 97/27933.

Becker et al discloses a method for determining the properties of a particle, including its response to a chemical or physical agent, and for separating particles of more than one type, comprising the steps of applying to a suspension of particles a first signal at a first frequency and at a plurality of different phases whereby the particles experience a traveling wave dielectrophoretic force of which there is a real part which is negative and of which there is also an imaginary part, and simultaneously applying a second signal at a second frequency whereby either the real part or the imaginary part of the traveling wave dielectrophoretic force on the particles at the first frequency is altered in magnitude (see p. 10, line 8 through p. 13, line 10; p. 22, line 19 through p. 23, line 2; p. 23, line 24 through p. 24, line 19; and claims 1, 16, 36-38; 42-44, 50-54, 56-58, 62, and 65-68). It is the Examiner's position that there inherently is a traveling wave dielectrophoretic window, as per instant claim 2. Becker et al also discloses an

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apparatus for the application of traveling wave dielectrophoresis comprising an electrode array on a substrate, first frequency signal operating means, frequency signal generating means, means for electrically summing the two signals from such means and applying the summed signal to the electrode array (see p. 10, line 8 through p. 13, line 10; p. 22, line 19 through p. 23, line 2; p. 23, line 24 through p. 24, line 19; and claims 1, 16, 36-38; 42-44, 50-54, 56-58, 62, and 65-68). Levitation of cells is performed, as per instant claim 3 (see p. 39, lines 8-16; and p. 44, lines 1-10). Becker et al teaches the separation of leukemia cells from human blood cells (see p. 37, line 24 through p. 38, line 11). Since Becker et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al, WO 97/27933.

Becker et al discloses a method for determining the properties of a particle, including its response to a chemical or physical agent, and for separating particles of more than one type, comprising the steps of applying to a suspension of particles a first signal at a first frequency and at a plurality of different phases whereby the particles experience a traveling wave dielectrophoretic force of which there is a real part which is

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negative and of which there is also an imaginary part, and simultaneously applying a second signal at a second frequency whereby either the real part or the imaginary part of the traveling wave dielectrophoretic force on the particles at the first frequency is altered in magnitude (see p. 10, line 8 through p. 13, line 10; p. 22, line 19 through p. 23, line 2; p. 23, line 24 through p. 24, line 19; and claims 1, 16, 36-38; 42-44, 50-54, 56-58, 62, and 65-68). It is the Examiner's position that there inherently is a traveling wave dielectrophoretic window, as per instant claim 2. Becker et al also discloses an apparatus for the application of traveling wave dielectrophoresis comprising an electrode array on a substrate, first frequency signal operating means, frequency signal generating means, means for electrically summing the two signals from such means and applying the summed signal to the electrode array (see p. 10, line 8 through p. 13, line 10; p. 22, line 19 through p. 23, line 2; p. 23, line 24 through p. 24, line 19; and claims 1, 16, 36-38; 42-44, 50-54, 56-58, 62, and 65-68). Levitation of cells is performed, as per instant claim 3 (see p. 39, lines 8-16; and p. 44, lines 1-10). Becker et al teaches the separation of leukemia cells from human blood cells (see p. 37, line 24 through p. 38, line 11). The application of the two frequency signals results in a time and horizontal displacement of matter (see p. 12, lines 3-15). The signals range from 10 kHz to 10 MHz (p. 13, lines 1-2). The use of a third signal would have been within the skill of an artisan. Becker et al teaches the limitations of the instant claims other than the differences which are discussed below.

Becker et al does not specifically teach varying the speed of the particles.

However, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to have varied the speed of the particles so that the particles could be separated.

Becker et al does not specifically teach a first signal of 55 kHz for TWD and a second static DEP signal at a frequency of 55 kHz, whereby the TWD window extends between 10 kHz and 18 MHz. However, as noted above, Becker et al teaches signals that range from 10 kHz to 10 MHz. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a first signal of 55 kHz for TWD and a second static DEP signal at a frequency of 55 kHz, whereby the TWD window extends between 10 kHz and 18 MHz, because such is within the scope of Becker et al's disclosure.

With respect to claim 25, Becker et al does not specifically teach that the substrate for the electrode array is transparent; illumination means to illuminate the substrate; and viewing means to view any particles on the substrate. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided for such features so that the particles could be viewed.

12. Claims are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al, WO 97/27933, in view of Pethig et al, WO 98/04355.

Becker et al discloses a method for determining the properties of a particle, including its response to a chemical or physical agent, and for separating particles of more than one type, comprising the steps of applying to a suspension of particles a first signal at a first frequency and at a plurality of different phases whereby the particles experience a traveling wave dielectrophoretic force of which there is a real part which is

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negative and of which there is also an imaginary part, and simultaneously applying a second signal at a second frequency whereby either the real part or the imaginary part of the traveling wave dielectrophoretic force on the particles at the first frequency is altered in magnitude (see p. 10, line 8 through p. 13, line 10; p. 22, line 19 through p. 23, line 2; p. 23, line 24 through p. 24, line 19; and claims 1, 16, 36-38; 42-44, 50-54, 56-58, 62, and 65-68). It is the Examiner's position that there inherently is a traveling wave dielectrophoretic window, as per instant claim 2. Becker et al also discloses an apparatus for the application of traveling wave dielectrophoresis comprising an electrode array on a substrate, first frequency signal operating means, frequency signal generating means, means for electrically summing the two signals from such means and applying the summed signal to the electrode array (see p. 10, line 8 through p. 13, line 10; p. 22, line 19 through p. 23, line 2; p. 23, line 24 through p. 24, line 19; and claims 1, 16, 36-38; 42-44, 50-54, 56-58, 62, and 65-68). Levitation of cells is performed, as per instant claim 3 (see p. 39, lines 8-16; and p. 44, lines 1-10). Becker et al teaches the separation of leukemia cells from human blood cells (see p. 37, line 24 through p. 38, line 11). The application of the two frequency signals results in a time and horizontal displacement of matter (see p. 12, lines 3-15). The signals range from 10 kHz to 10 MHz (p. 13, lines 1-2). The use of a third signal would have been within the skill of an artisan. Becker et al teaches the limitations of the instant claims other than the differences which are discussed below.

With respect to claim 25, Becker et al does not specifically teach that the substrate for the electrode array is transparent; illumination means to illuminate the

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substrate; and viewing means to view any particles on the substrate. However, these features are conventional in the art, as shown by Pethig et al (see Figure 5; and pages 8-9). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided Becker et al's apparatus with a transparent substrate, illumination means to illuminate the substrate and viewing means to view any particles on the substrate because such is conventional in the art as shown by Pethig et al.

Becker et al does not specifically teach varying the speed of the particles. However, It would have been obvious to one of ordinary skill in the art at the time the invention was made to have varied the speed of the particles so that the particles could be separated.

Becker et al does not specifically teach a first signal of 55 kHz for TWD and a second static DEP signal at a frequency of 55 kHz, whereby the TWD window extends between 10 kHz and 18 MHz. However, as noted above, Becker et al teaches signals that range from 10 kHz to 10 MHz. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a first signal of 55 kHz for TWD and a second static DEP signal at a frequency of 55 kHz, whereby the TWD window extends between 10 kHz and 18 MHz, because such is within the scope of Becker et al's disclosure.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. WO 91/11262, the journal article by Wang et al, and the journal

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article by Masuda et al were cited in the search report during the PCT stage of the instant application. Also made of record are U.S. Patents 5,653,859, 5,814,200 5,993,632, and 6,641,708, and WO 97/34689.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond
Primary Examiner
Art Unit 1753

Alan Diamond
May 5, 2004

A handwritten signature in black ink, appearing to read 'Alan Diamond', with a stylized flourish at the end.